**Unit 3 - Chemistry of Life – Study Guide**

**3.1 Chemical Elements and Water (2)**

1. Do you know what the four most commonly occurring elements in nature are?

2. Can you remember what these inorganic substances are used for? (in plants and animals)

a. Iron b. Sulphur c. Calcium d. Phosphorous e. Sodium

3. Can you draw two water molecules attracted to one another by hydrogen bonding? Include labels and show the polarity of the molecules.

4. Water has many properties which are essential for life. Can you explain the main properties of water and their significance to living things? (thermal, cohesive, solvent)

**3.2 Carbohydrates, Lipids and Proteins (2)**

5. Can you distinguish between organic and inorganic compounds?

6. Can you list the main organic molecules used by living things and their functions?

7. Can you draw the basic structure of a glucose and ribose molecule, a fatty acid and an amino acid?

8. Can you remember 3 examples of monosaccharides, disaccharides and polysaccharides?

9. Do you remember the functions of glucose, lactose and glycogen in animals?

10. What about the functions of fructose, sucrose and cellulose in plants?

11. Can you explain the processes of condensation and hydrolysis?

12. Can you associate the two processes above with the relationships between mono, di and polysaccharides; between fatty acids, glycerol, and triglycerides; and between amino acids and polypeptides?

13. Do you know what triglycerides are made of?

14. Can you differentiate between saturated and unsaturated fats in terms of

a. Bonds in the fatty acid chain b. State at room temperature c. Origin (plants or animals)

15. Can you compare lipids and carbohydrates in terms of energy storage?

**3.3 DNA Structure (1)**

16. Can you draw and label a single DNA nucleotide?

17. Do you remember the names of the four bases in DNA?

18. Can you draw a DNA molecule with two pairs of nucleotides and label the bonds between them?

19. Can you describe the DNA structure?

**3.4 DNA Replication (1)**

20. Do you know the main purpose of replicating DNA?

21. Can you explain the process of DNA replication? Can you cite the main enzymes involved? (draw and label a diagram explaining the process of DNA replication)

22. Do you know what it means to say that ‘*DNA replication is semi-conservative’*?

**3.5 Transcription and Translation (2)**

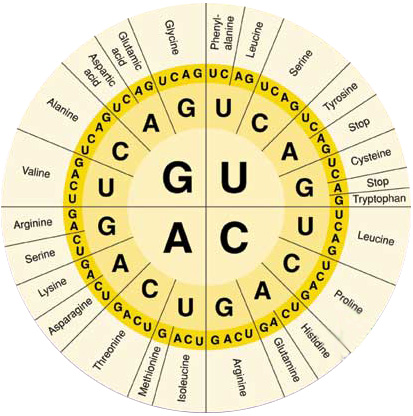
23. Can you compare the structures of DNA and RNA?

24. Can you explain the transcription process and the enzymes involved?

25. Can you define codons?

26. Can you explain the process of translation? (include the roles of mRNA, tRNA, codons, anticodons, ribosomes and amino acids)

27. Can you discuss the relationship between one gene and one polypeptide?

28. Can you compare the processes of *transcription* and *translation* in relation to what their initial and final products are and where they happen?

29. Do you know the difference between *triplets* and *codons*?

30. Using the diagram, can you deduce the amino acids coded for by these codons:

AUG CAG

UCA GAC

AAA UGA/UAG

31. Do you know what is meant by these phrases:

a. ‘*The genetic code is universal’?*

b. ‘*The genetic code is degenerate’?*

**3.6 Enzymes (2)**

32. Can you define enzyme and active site?

33. Can you explain the reason why enzymes are substrate-specific?

34. Can you outline the effects of temperature (low, high), pH and substrate concentration on enzyme activity? Can you produce sketch-graphs to illustrate each factor mentioned?

35. Can you define denaturation?

36. Do you know why lactase is used in the production of lactose-free milk?

**3.7 Cell respiration (2)**

37. Can you define *cell respiration*? Do you know the equation that summarizes this process?

38. Can you explain what happens during glycolysis? Where does it happen?

39. Can you outline what happens to pyruvate during anaerobic cell respiration? What about aerobic? Where do these processes happen?

40. Can you compare the anaerobic and aerobic processes in relation to reactants, products, location, purpose and ATP produced?

**3.8 Photosynthesis (3)**

41. Do you know the purpose of photosynthesis?

42. Do you know what is necessary for photosynthesis to occur?

43. Can you write an equation that illustrates the process of photosynthesis?

44. Can you outline the differences in absorption of red, blue and green light by chlorophyll?

45. Do you know why light is necessary during this process?

46. Do you know what ATP and hydrogen are used for during photosynthesis?

47. Do you know how to measure the rate of photosynthesis?

48. Can you explain the effects of temperature, light intensity and carbon dioxide concentration on the rate of photosynthesis?